

# e+a Induction Rotor Manual



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## 1 Rotor types

There are two rotor types or versions. The main difference is the conductor material of the squirrel cage. There are aluminium die-cast rotors (Al rotors) and copper rotors (Cu rotors). The laminated cores of the rotor versions with closed slots cover the rotor bars. In these models, only the short circuit rings indicate what conductor material is used. The short circuit rings are on the ends (front sides) of the rotors. The laminated core consists of individual, thin laminates, which are layered in the axial direction.



Al rotor



Cu rotor

## 2 Delivery mode

The rotor versions as described in this manual are unmachined. In principle, however, it is possible to have the e+a rotors pre-turned down to grinding stock. This means that, for most applications, the rotor can be shrunk directly onto the arbour without further interior processing. The interference fits, depending on the speed, can be found in the e+a documentation.

Aluminium die-cast rotors can be recognised by their aluminium-coloured short circuit rings. The surface of the laminated core of aluminium die-cast rotors can be polluted by aluminium residues.

The processing of copper rotors includes soldering. Soldering residues on the rotor surface are an inevitable result of this treatment.

Processing residues on the surface of the outer diameter can mean that the rotor surface is no longer completely even or round.

During transport, copper rotors are particularly vulnerable to mechanical damage. During the manufacturing process, the copper rotor bars are annealed by heat treatment.

If rotors standing vertically topple over, the entire laminated core could be bent, which would render the rotor unusable.

### 3 Storage

The rotors must remain in their original packaging during transport and storage, until the moment of assembly. Alternatively they can be stored as outlined below.

Store in a dry, dust-free and vibration-free interior environment.

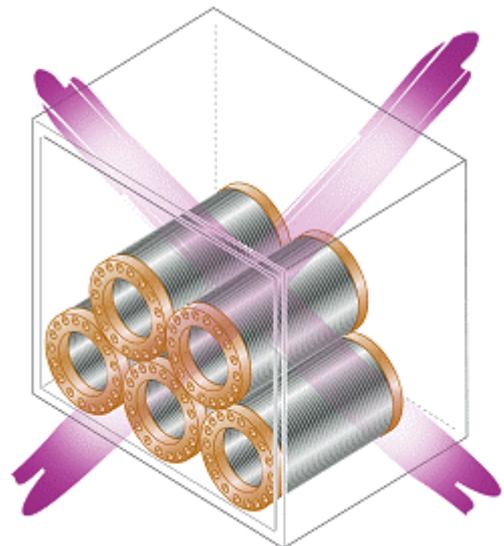
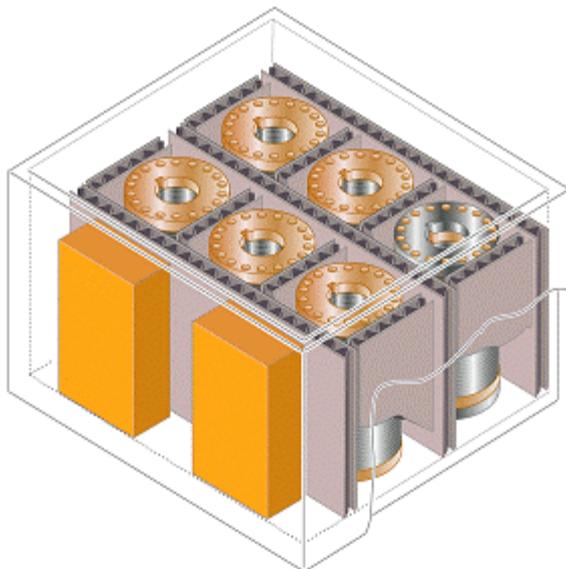
Due to the different material properties of aluminium and copper rotors different storage instructions apply.

#### 3.1 Copper rotors

In the normal course of events, store copper rotors vertically (standing), unless they are delivered with a special transport mandrel. Do not remove the transport mandrel while the rotor is stored horizontally.

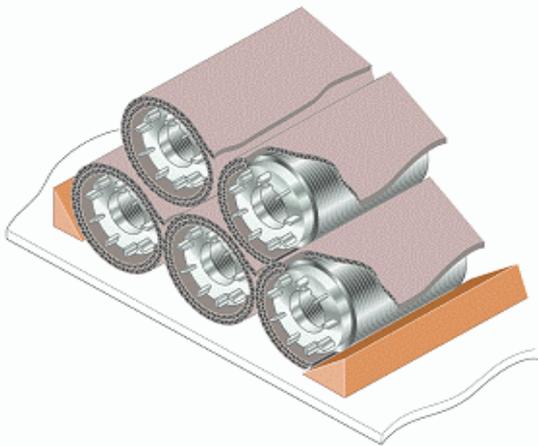
Separate rotors, which stand next to one another, with cardboard to prevent direct contact. The cardboard protects the rotors from knocking against one another.

Soldering residues in the area of the short circuit rings may, in the worst case, result in the outer rotor diameter being smaller in the middle of the laminated core than on the rotor ends. This means that the rotors, when stored horizontally, do not rest on their entire length. The net weight of the rotors is enough to bend them during transport, or during an extended storage period respectively. This may result in faults in further rotor processing.



### 3.2 Aluminium rotors

Principally, the same instructions apply for aluminium as for copper rotors. However, aluminium rotors are less vulnerable to mechanical damage during transport. As long as they are suitably enveloped with cardboard, they can be stored horizontally. Depending on the size of the aluminium rotors, they can be stored in two or several layers.



## 4 Transport

Instructions for all rotor versions: Ensure that vertically stored rotors are well secured against toppling over. Furthermore, ensure that rotors cannot roll to and fro, and knock against one another, during transport. It is recommended that rotors are transported in an upholstered container. Secure the rotors and separate them using cardboard strips or corrugated cardboard. Horizontally placed aluminium rotors can be lifted by simultaneous grip into both sides of the rotor bore. The same applies to copper rotors, as long as they are carefully placed on their sides, (which is only permissible, in such instances as when the rotor is immediately lifted to the place of processing). Lighter rotors can also be lifted by hand, by holding them on the outer diameter. Very heavy versions are ideally lifted and transported with a round, straight bar, which is introduced through the bore. In all cases, deposit rotors gently! Never drop them!

## 5 Processing/machining

### 5.1 Reference contour

The rotor bore (inner diameter) is the reference contour. First clamp the inside of the rotor bore, in order to process the outer diameter. This prevents mechanical and electrical asymmetries.

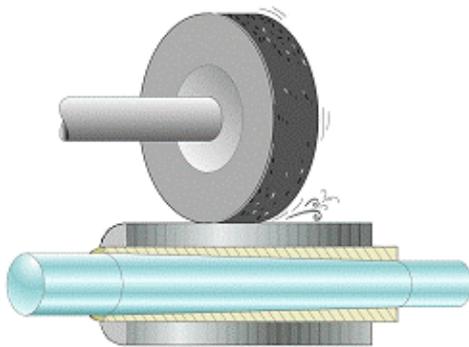
## 5.2 General machining instructions

In order to machine rotors, use specialised, surface covering clamping tools.

Use the rotor bore as the reference contour. As a first step, clamp the rotor inside the rotor bore as fully as possible (covering the entire surface) in order to machine the outer diameter. Subsequently, clamp the outer diameter surface equally fully to machine the rotor bore.

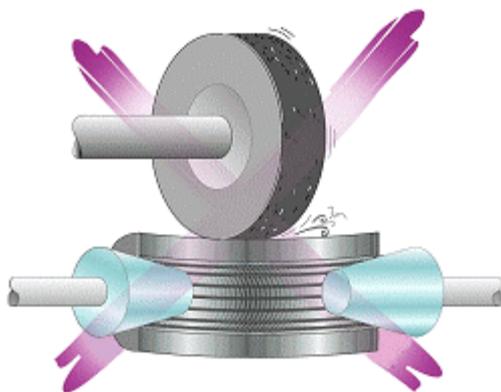
Use cutting tools with polished cutting edges. During processing, choose a moderate feed and cut speed. Ignoring these instructions may lead to axial stretching of the rotor core. The original rotor length must be retained.

After shrinking the rotor onto the arbour, use the plunge cut method, and not the pendular grinding method, for the last finishing steps. Using the plunge cut method reduces the formation of burr on the laminates. Should residual burr occur on the front side, remove it by breaking it off. At the end of the process, every single laminate should be recognisable.



**Correct** lifting of work piece:

- Expanding mandrel passes through the entire rotor bore.



**Incorrect** clamping process:

- Do not clamp at the ends only!

### 5.3 Machining tolerances

Machining tolerances can be found in the relevant e+a Documentation.

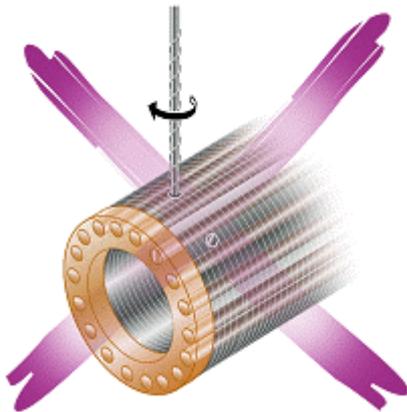
### 6 Heat treatment

Thermal relaxation or drying of induction rotors in ovens is permissible. Do not exceed the maximum temperature of 300°C.

### 7 Balancing of induction rotors

#### 7.1 Aluminium rotors and copper rotors without steel rings

For aluminium and copper rotors without steel reinforcement rings, use additional balancing discs. Do not drill into the laminated core or the short circuit ring of the above-mentioned rotor types! Ignoring this may result in electrical or mechanical faults.



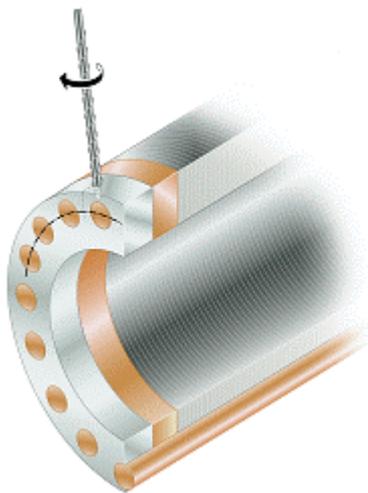
**Incorrect** balancing of aluminium and copper rotors:

- Do not bore into the laminated core!
- Do not bore into the short circuit ring!

## 7.2 Copper-steel rotors

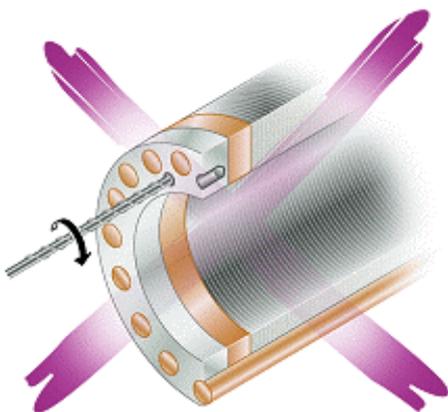
**Radial** boring of the steel ring is permissible for balancing purposes. Only bore between the copper bars. Do not bore balancing holes deeper than to the circle diameter of the slots. Deeper bore holes can weaken the steel ring sufficiently to destroy the motor in operation.

Do not bore the steel ring in the axial direction on the inside of the copper slots. This can weaken the steel ring sufficiently to destroy the motor in operation.



### Correct balancing of copper-steel rotors:

- Bore between two copper bars!
- Depth of bore no deeper than the slot centre (see circle indicated in sketch)



### Incorrect balancing of copper-steel rotors:

- Do not bore the front side of the steel ring! (weight bearing area of the of steel ring)